INFLUENCE OF ORGANIC MATTER ON BIO-AVAILABILITY OF CARBOSULFAN AND ITS TOXICITY ON A CARABIDAE

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Study of factors influencing soil insecticide toxicity is a necessity to reduce negative impacts of these products on beneficial insects. To date, if high toxicity differences between different type of soils have been reported, there is no specific studies on soil parameters influence on selectivity of soil insecticides to beneficial arthropods. To assess the specific rule of organic matter, we have studied the relationship between bio-availability of a soil insecticide, carbosulfan [Sheriff 1 Gr], and its toxicity on a small Carabidae, *Bembidion lampros* (Herbst.) on a sand enriched with increasing quantities of organic matter.

In laboratory conditions, adults of *B. lampros* were put on exposure units made of a plastic vial filled with sand or sand with addition of organic matter at 3%, 6% and 9% w/w. These units were treated with the insecticide applied as granule at the rate of 312.5 µg, 625 µg, 1250 µg and 6250 µg a.i./m corresponding respectively to 0.5%, 1%, 2% and 10% of the recommended field rate. In treated and control boxes, mortalities of *B. lampros* were observed several times, and 14 days after treatment, final observations were realised to calculate the corrected mortalities. In parallel, the bio-availability of carbosulfan in these substrates was measured by HPLC after 48h. Both the bio-availability fraction extracted with CaCl2 solution and the total fraction, extracted with acetonitrile solution were dosed. According to the mortalities and bio-availability obtained, a dose - response was calculated and compared with a reference relation dose - response obtained on sand, where the bio-availalbility of the product was considered as reaching 100% of the amount of product applied.

Carbosulfan was highly toxic on sand for *B. lampros*, with 100%, 57% and 50% mortality at 10%, 2% and 1% of the recommended field rate. When organic matter was added to the sand, the toxicity gradually decreased. This reduction in toxicity was rapidly observed with 2% and 1% of the field rate, with 3% and 6% of organic matter while this reduction was less severe at 10% of the field rate, with 97%, 75% and 46% mortality with 3%, 6% and 9% of organic matter added to the sand. The mortalities were strongly correlated with the bio-availability, indicating first that the organic matter can fixed a part of the insecticide and reduce its toxicity to beneficials arthropods and secondly that determination of bio-availability in the field can help to predict toxicity of pesticides to beneficials on several type of soils.

In conclusion, the organic matter influences strongly bio-availability of carbosulfan and thus its toxicity to *B. lampros*. With the improvement of bio-availability determination and method validation, the assessment of pesticide bio-availability in the substrate could help to estimate the pesticide toxicity towards carabidae on different type of soils.